Another arrangement of proximity-type, direct station selection switches in accordance with the invention is shown in FIG. 6. A repertory dialer telephone set **601**, including a housing **61**, handset **62** and a Touch-Tone dial **63**, is equipped with a card file drawer **66** which may be withdrawn from the housing **61**. Access to the repertory store (not shown) of the telephone set **601** is provided by the proximity switch touch-buttons **64**, a number of which are fabricated on each of a plurality of plastic index cards **65** which may conveniently be filed alphabetically as shown. With the set shown in FIG. 6 a call to a distant station having its directory number recorded in the telephone set repertory may be initiated simply by touching that one of the touch-buttons **64** which corresponds to the stored directory number of the station to be called.

Another DSS switch array in accordance with the invention is shown in FIG. 7 in combination with a repertory dialer telephone set **701**. In this case all of the DSS proximity switches **707** are fabricated on a single sheet of plastic **706** which is mounted in scroll form within the telephone housing **702**, so that selected ones of the switches and their corresponding written station indicia are exposed to visual and manual access through window **705**. The scroll may be rotated by a suitably connected thumb wheel **704** or, alternatively, may be motor driven in a manner well known in the art. Electrical connections to the switches on the moving scroll may be provided by way of simple leaf spring contacts or by encapsulating the necessary leads in the substrate and making connections thereto at the anchored end of the scroll. Again, as in the embodiments shown in FIGS. 5 and 6, a call to a distant station may be initiated simply by removing the handset **72** from its cradle and by touching that one of the pushbuttons **707** which corresponds to the stored number in the repertory representing the station to be called.

From a system standpoint any one of a wide variety of direct station selection arrangements is possible with telephone sets utilizing proximity switch combinations in accordance with the invention. One such system is shown, for example, in FIG. 4. A plurality of DSS sets **41**, **42** and **43** each includes a Touch-Tone dial **46** and an array of proximity switches **44** corresponding to written station indicia **45**. Operation of any one of the touch-buttons **44** is detected in the manner described above and an appropriate signal is sent to the centralized local storage and switch unit **47** which may include equipment of the type shown by R. A. Plyer in either of the patents cited above to effect the interconnection with one of the stations in the local system. Alternatively, a suitable signal may be sent to the unit **47** and, after suitable translation, to the central office **48** to effect the usual switching required to complete a connection to a selected distant station served by the central office.

In accordance with the invention, as shown in FIG. 8, a somewhat simplified proximity switch may be utilized to effect DSS connections. For each proximity switch of this simplified type only a single conductive pad **88**, which also serves as the touch-button, is employed in lieu of the three pads required by the switch shown in FIG. 1. Otherwise, construction of the switch inself is similar in that the single conductive element **88** of each switch is mounted on a common plastic substrate. The circuit of FIG. 8 requires a detector **83** and an oscillator **86** similar to that utilized by the arrangement shown in FIG. 3, although the specific manner of operation is different. Capacitor C_B represents the capacitance of the human body to earth ground which normally exceeds 40 pf. With the introduction of capacitor C_B into the circuit, a path is completed from the touch-button **88** to earth ground **80**. Touch-button **88** is also connected to the detector **83** through the capacitor **C81** which limits the signal input so that the detector **83** is not overdriven even if the button **88** is physically connected to the earth ground **80**. The output from the detector **83** is applied to an output point **84** to operate a suitable switch **85** which initiates the desired connection. The circuit path back to earth ground **89** is completed through the oscillator **86** and through a large coupling capacitor C8. The output signal frequency and amplitude of the oscillator **86** are designed to be sufficiently high so that the human body capacitance C_B couples enough energy into the detector **83** to permit the detector to generate a usable output. An oscillator frequency of 10 kc. and a 10-volt, peak-to-peak output would, for example, be suitable.

Details of the detector circuit **83** are shown in FIG. 9. The detector comprises the common emitter transistors Q3, Q4 and Q5. Resistors **R91**, **R92**, **R93**, **R94**, **R95** and **R96** in combination with the power source **90** provide the proper biasing potentials for the transistors. Capacitor **C91** serves the same signal filtering function as capacitor **C36** shown in FIG. 3. The diode **D91** protects the base-emitter junction of transistor Q3 from reverse breakdown.

In operation, transistor Q5 is normally saturated and both transistors Q3 and Q4 are off. An oscillator input to the detector, which appears upon the introduction of the capacitance C_B into the circuit, is detected and amplified by transistor Q3, integrated by capacitor **C91**, and the resultant D.C. level is employed to turn on transistor Q4 thereby turning transistor Q5 off. The change of state as applied to the output point **84** is utilized to initiate switching as described above. The circuit shown may readily be designed to change the output state of transistor Q5 if the body capacitance C_B exceeds **30** pf. Requiring capacitance of this level reduces the possibility of erroneous triggering which might otherwise be caused by static charges or stray capacitances.

Owing to its simplicity, the single lead, single element type of switch shown in FIGS. 8 and 9 is particularly suitable for a DSS switch array of the type shown in FIG. 10. In FIG. 10 a number of elongated metallized areas **102**, each having a respective connecting lead **103**, are deposited or otherwise affixed to an opaque insulating sheet **101**. A sheet of paper **104** with station names corresponding to the touch-buttons **102** printed or typed thereon is placed directly over the sheet **101** so that each printed indicia is superimposed on a corresponding one of the touch-buttons. A clear plastic protective cover sheet **105** may then be positioned over the name sheet **104**. The assembly of the three sheets **101**, **104** and **105** may then be suitably mounted on the face portion of a repertory dialer or other form of DSS telephone set, so that a call may be initiated simply by touching the plastic sheet **105** directly over the printed name of the party to be called. The arrangement shown in FIG. 10 may be readily modified to permit fabrication and installation of the selector switches in book, scroll or index card form as shown in FIGS. 5, 6 and 7.

It is to be understood that the embodiments disclosed herein are merely illustrative of the principles of the invention. Various modifications thereto may be effected by persons skilled in the art without departing from the spirit and scope of the invention.

What is claimed is:

1. A direct station selection telephone set comprising, in combination, a plurality of proximity switches, each of said switches comprising at least one conductive element mounted on a common substrate, one of said elements in each of said switches comprising a respective touch-button, means for detecting the operation of one of said touch-buttons, and means responsive to said detecting means for initiating the automatic transmission of signal indicia associated with a distant station corresponding to an operated one of said touch-buttons.

2. Apparatus in accordance with claim **1** wherein said detecting means includes an oscillator and a solid state device operated detector circuit.

3. Apparatus in accordance with claim **2** wherein each